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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,629	03/31/2004	Ryosuke Usui	65933-084	3812

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EXAMINER	
NGUYEN, DILINH P	
ART UNIT	PAPER NUMBER
2893	
MAIL DATE	DELIVERY MODE
09/15/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/813,629	USUI ET AL.	
	Examiner	Art Unit	
	DILINH P. NGUYEN	2893	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,11,15,16 and 29-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,11,15,16 and 29-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/18/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/10/2008 has been entered.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-5, 11, 15-16 and 29-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaneshiro et al. (JP 10-284648) in view of Pechenik et al. (U.S. Pat. 5147446).

Regarding claims 1, 15, 29 and 34, Kaneshiro et al. disclose a semiconductor module comprising:

an insulating base material 5A provided with a conductor circuit;

a semiconductor element 7 formed on the insulating base material; and

an insulator 12 disposed in contact with the insulating base material and the semiconductor element;

wherein the insulating base material 5A is provided with minute projections on a surface thereof (the surface of the solder resist film is roughened) (paragraph 0012) is in contact with the insulator 12 (fig. 2 and abstract), the minute projections being a part of the insulating base material 5A and comprising projections and recesses on a portion of the insulating base material 5A being in contact with the insulator 12 (fig. 2, paragraphs 0012 and 0034). The surface of the solder resist film is roughened (paragraph 0012); thus, there are pluralities of recesses for projections on the surface of the base material 5A.

Kaneshiro et al. do not explicitly disclose that the projections have 1nm to 20 nm in average diameter and formed in number density of not less than 0.5×10^3 μm^{-2}.

However, Pechenik et al. disclose a device structure comprising: a plurality of particles ranging in size from 1.0 to 50 nm (column 1, lines 16-17) and formed in number density from about 60 to 100% of full density (column 4, lines 37-39).

Therefore, as to claims 1, 15, 29 and 34, it would have been obvious to one having ordinary in the art at the time the invention was made to modify the device of Kaneshiro et al. by having a plurality of nanoparticles ranging in size from 1.0 to 50 nm and forming in number density from about 60 to 100% of full density as taught by Pechenik et al. in order to provide a method of fabricating dense, nearly ideally package compacts of nano-sized particles.

Regarding claims 2 and 30, Kaneshiro et al. disclose that the insulator 12 is a sealing resin for sealing the semiconductor element therein (fig. 2, abstract, line 19).

Regarding claims 3 and 31, Kaneshiro et al. disclose that the insulator is an adhesive provided between the semiconductor element and the insulating base material (fig. 2).

Regarding claims 4-5, 16 and 32-33, Kaneshiro et al. disclose that the plasma treatment is performed on the insulating layer to form the unevenness on the surface of the insulating layer or to roughen the surface. This shows that, by ensuring that arithmetic mean roughness of the surface of the insulating base material 5A is $\leq$ 0.2 μm or desirably, $\leq$0.4 μm, adhesion between the insulating base material 5A and the sealed body 12 is enhanced (paragraphs 0033 and 0035). Therefore, a surface of the insulating base material 5A of Kaneshiro et al. would has a plurality of shaped recesses that is in contact with the insulator 12 (fig. 2). Kaneshiro et al. do not explicitly disclose the recesses are crater-shaped. However, the recess of Kaneshiro et al. would have the shape of crater.

Moreover, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form a plurality of crater-shaped recesses. A change in shape is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955).

Response to Arguments

Applicant's arguments filed 9/10/2008 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no reasonable support to combine Kaneshiro with Pechenik, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case:

Kaneshiro et al. substantially disclose all the limitations as claimed in claims 1, 15 and 29 except for the projections have 1nm to 20 nm in average diameter and formed in number density of not less than 0.5×10^3 μm^{-2}.

However, Pechenik et al. disclose a device structure comprising: a plurality of particles ranging in size from 1.0 to 50 nm (column 1, lines 16-17) and formed in number density from about 60 to 100% of full density (column 4, lines 37-39).

Therefore, as to claims 1, 15 and 29, it would have been obvious to one having ordinary in the art at the time the invention was made to modify the device of Kaneshiro

et al. by having a plurality of nanoparticles ranging in size from 1.0 to 50 nm and forming in number density from about 60 to 100% of full density as taught by Pechenik et al. in order to provide a method of fabricating dense, nearly ideally package compacted of nano-sized particles.

The applicant argues that neither Kaneshiro et al. nor Pechenik et al. disclose the minute projections being a part of the insulating base material and comprising projections and recesses on a portion of the insulating base material 5A being in contact with the insulator.

Applicant's arguments have been fully considered but they are not persuasive because Kaneshiro et al. disclose that the insulating base material 5A is provided with minute projections on a surface thereof (the surface of the solder resist film is roughened) (paragraph 0012) is in contact with the insulator 12 (fig. 2 and abstract), the minute projections being a part of the insulating base material 5A and comprising projections and recesses on a portion of the insulating base material 5A being in contact with the insulator 12 (fig. 2, paragraphs 0012 and 0034). The surface of the solder resist film is roughened (paragraph 0012). Thus, there are recesses for the projections on the surface of the base material 5A. Consequently, the amended claims 1, 15 and 29 still have not overcome the cited references (see rejection above).

For the fore going reasons, the rejection is properly maintained. Dependent claims 2-5 and 11 fall with the independent claim 1, dependent claim 16 falls with the independent claim 15, and dependent claims 30-35 fall with the independent claim 29.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DILINH P. NGUYEN whose telephone number is (571) 272-1712. The examiner can normally be reached on 9:00 AM - 6:30 PM (Monday-Thursday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davienne Monbleau can be reached on (571) 272-1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DLN

9/12/2008

/(Vikki) Hoa B Trinh/

Examiner, Art Unit 2893